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PROVISIONAL INTELLIGENCE REPORT

PRODUCTION OF AIRCRAFT IN THE EUROPEAN SATELLITES



CIA/RR PR-126

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PROVISIONAL INTELLIGENCE REPORT

PRODUCTION OF AIRCRAFT IN THE EUROPEAN SATELLITES

CIA/RR PR-126

(ORR Project 33.496)

NOTICE

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FOREWORD

This report is an extension of an earlier basic report, CIA/RR 52, The Aircraft Industries of the European Satellites, 10 January 1955, SECRET, which intensively analyzes the aircraft industries of the European Satellites and thoroughly discusses the methodology involved in the production of airframe and aircraft engine estimates. This report covers the period from 1951 to 1957 but does not discuss topics covered in the previous report unless significant changes have occurred or unless discussion is needed for purposes of comparison. Throughout the report, all information not otherwise documented has been taken from CIA/RR 52.

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PRODUCTION OF AIRCRAFT IN THE EUROPEAN SATELLITES*

Summary

The aircraft industries of the European Satellites produced about 1,000 airframes in 1954. On the basis of present capacity and production trends, annual production will have increased by 1957 to about 1,300 airframes (see Table 1**). The production of aircraft engines and spare parts was sufficient to balance the production of airframes in 1954, and the aircraft engine plants in the European Satellites have the capability to increase their production to the estimated requirements for 1957.

The total value of airframes and aircraft engines produced in the European Satellites in 1954 is estimated at US \$192 million in 1951 prices. The value of production as projected to 1957 is US \$348 million, or 181 percent of the 1954 value of production.

Current trends indicate that the major producer of aircraft in the European Satellites during the next few years will continue to be Czechoslovakia, which currently is producing Soviet-designed Fagot (MIG-15) jet fighters, Midget (U-MIG-15) jet trainers, and Beast (IL-10) ground attack aircraft and their engines. Production of the Beast is being phased out, and, in its place, Czechoslovakia may produce the Beagle (IL-28) jet light bomber. The production complex in Prague probably will shift from current production of the Fagot to the more modern Fresco (MIG-17) jet fighter in 1956.

Poland, which at present produces only Fagots, will continue to be a secondary producer but is expected to shift into the production of the Fresco in 1957. East Germany produced no aircraft in 1954 but is expected to begin production of civil transport aircraft by 1957. Although Hungary and Rumania produce small trainers, their production and that of the remaining European Satellites probably will be insignificant.

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 15 August 1955.

** Table 1 follows on p. 2.

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Table 1

Estimated Production of Airframes in the European Satellites
1954 and 1957

Country	Type of Airframe ^{a/}	Estimated Production	
		1954	1957
Czechoslovakia	Fagot (MIG-15)	394	0
	Midget (U-MIG-15)	89	276
	Fresco (MIG-17)	0	277
	Beast (IL-10)	207	0
	Beagle (IL-28)	0	125
	Trainer	165	339
East Germany	Crate (IL-14)	0	75
Hungary	Trainer	24	24
Poland	Fagot	65	82
	Fresco	0	79
	Trainer	60	0
Rumania	Trainer	24	24
Total		<u>1,028</u> ^{b/}	<u>1,301</u> ^{c/}

a. For the aircraft designations used in this report, which are the standard US-UK designations, see Appendix A.

b. Margin of error is about minus 15 to plus 20 percent.

c. Margin of error is about minus 50 to plus 100 percent.

Soviet policy will continue to govern the development of the aircraft industries of the European Satellites, and Satellite production of combat aircraft will continue to consist of Soviet types. The eventual goal of Soviet policy appears to be to make the Satellites as a group self-sufficient in the production of the aircraft that they require.

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I. Introduction.

A. Purpose and Scope.

The primary purpose of this report is to provide estimates of the current and future production of the aircraft industries of the European Satellites. The secondary purpose is to estimate the dollar value of this production and develop an index of aircraft production which will indicate the rate of growth of this sector of the economies of the Satellites.

B. Importance.

The importance of the aircraft industries of the European Satellites lies in their current ability to modernize and increase their air combat strength almost entirely from native production. The production of aircraft in the Satellites in 1954 was about 11 percent of the production of the Soviet aircraft industry. By using considerable production capability which currently is not utilized, the Satellites could increase production to almost 40 percent of the production of the USSR if both industries should be mobilized to capacity production.

The aircraft industries of the European Satellites, which were relatively insignificant during the postwar years, received an impetus in 1951 when Czechoslovakia and Poland received drawings for the Beast (IL-10) ground attack aircraft and the Fagot (MIG-15) jet fighter from the USSR. From mid-1952 to July 1953, East Germany worked to organize an aircraft industry to produce the Fagot and the Max (YaK-18) trainer. These plans were canceled in July 1953, probably in connection with the "new course." The East German aircraft industry reportedly is being reorganized to produce the Crate (IL-14) light transport aircraft and perhaps later a 4-jet transport aircraft of German design. 1/* The continued low production in the remaining Satellites reflects their limited productive capability. Manufacture in Bulgaria, Hungary, and Rumania has been confined to a few light aircraft of native design.

Further evidence of the increased significance of the Czechoslovak and Polish aircraft industries is the construction of new production facilities. In Czechoslovakia, three new plants have been constructed: the first, the Rudy Letov II Plant in Vodochody

* For serially numbered source references, see Appendix D.

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near Prague, where construction was still in progress in early 1955, 2/ began the final assembly of Fagots in June 1953; the second, the Let plant in Kunovice, began production of the Moose (YaK-11) advanced trainer in late 1953; and the third, the Jan Sverma plant in Stara Boleslav, was incorporated into the jet engine program at about the same time. In Poland a plant reportedly scheduled to produce Fagot subassemblies has been built next to the airfield at Lublin/Swidnik. 3/

Czechoslovakia currently is the most important producer in the European Satellites, with a 1954 production of 483 Fagots and Midget (U-MIG-15) jet trainers, and 207 Beasts. Poland is second in importance, with a 1954 production of 65 Fagots.* East Germany, however, has by far the greatest importance as a potential producer. East Germany, if mobilized and given adequate equipment, would rank as the major Satellite producer, with Czechoslovakia in second place. The contribution of the remaining Satellites to the production of aircraft will continue to be minor.

C. Current Developments.

1. Albania.

Albania has no aircraft industry and will not be discussed further in this report.

2. Bulgaria.

Bulgaria is not believed to have produced any aircraft since the end of 1953, when the production of Laz trainers was ended. There is no indication of future plans for production. Bulgaria imported Fagots from Czechoslovakia in 1954 and imported Fagots and Midgets in early 1955. 4/

3. Czechoslovakia.

The most significant recent developments in the aircraft industries of the European Satellites have taken place in Czechoslovakia, where part of the Fagot production complex in Prague was turned over to the production of the Midget. Since September 1954, both Fagots and Midgets have been produced at about the same rate at the Rudy Letov II plant in Vodochody.

* See Table 4, p. 12, below.

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The Midget will fill a useful role in all of the air forces of the European Satellites. In September 1954 the Satellites had a total of only twenty-five 2-seat jet trainers. ^{5/} The transition from the production of the Moose, the standard advanced trainer, to that of high-performance jet aircraft will be made more easily by using the 2-seat Midget rather than the 1-seat Flora (YaK-23) jet fighter, which was used formerly. Introduction of the Midget may herald a stepped-up training program.

The sighting in March 1955 of three Beagle (IL-28) jet light bombers with Czechoslovak Air Force markings imported from the USSR ^{6/} indicates that Czechoslovakia intends to form a jet light bomber unit in its air force, thus significantly increasing its combat ability. The fact that Czechoslovakia intends to fill its previously unmet requirement for jet light bombers tends to reinforce the probability that it will begin production of the Beagle in the near future.

4. East Germany.

An East German aircraft industry is being organized again, after a period of inactivity since July 1953. The industry is controlled by Main Administration No. 18 of the Ministry for Machine Construction. ^{7/} Initially, the Crate will be produced. Later, a 4-jet transport aircraft of German design designated "152" allegedly may be produced, after development work has been completed. ^{8/} Airframes will be produced at the former Siebel plant in Schkeuditz, ^{9/} and the aircraft engines at a plant in Karl Marx Stadt (formerly Chemnitz). ^{10/} Considering the amount of organization and production planning required to get the program under way, the production of aircraft probably will not begin before mid-1956.

This new program appears more reasonable than the 1952-53 plans to produce the Fagot. Politically, production of transport aircraft probably would be more popular than the production of fighters in East Germany. Economically, the whole Sino-Soviet Bloc has a requirement for modern transport aircraft to replace the Cab (LI-2), light transport aircraft, which is a prewar design. From a security point of view, Schkeuditz and Karl Marx Stadt are less subject to Western observation than Dessau and Ludwigsfelde, the production centers originally designated, which were in an air corridor into Berlin.

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5. Hungary.

The sighting of a Soviet Beagle with Hungarian Air Force markings 11/ may indicate that Hungary intends to strengthen its air force by the addition of jet light bombers. It is not known whether future Beagles will come from Czechoslovak or Soviet production.

6. Poland.

In addition to the production of 65 Fagots, Poland produced an estimated 60 Junak-1 primary trainers in 1954. This quantity appears to have satisfied the requirement because production apparently was stopped late in 1954.

7. Rumania.

There have been no significant developments in the aircraft industry of Rumania during 1954-55.

II. Production Facilities.*

A. Airframes.

The estimated floorspace devoted to the production of airframes in the European Satellites in the first half of 1955 was 3.13 million square feet, a slight increase over the 1954 floorspace. The 4 plants in Prague, Czechoslovakia, account for 70 percent of the total floorspace. The plants currently producing airframes in the Satellites are listed in Table 2.**

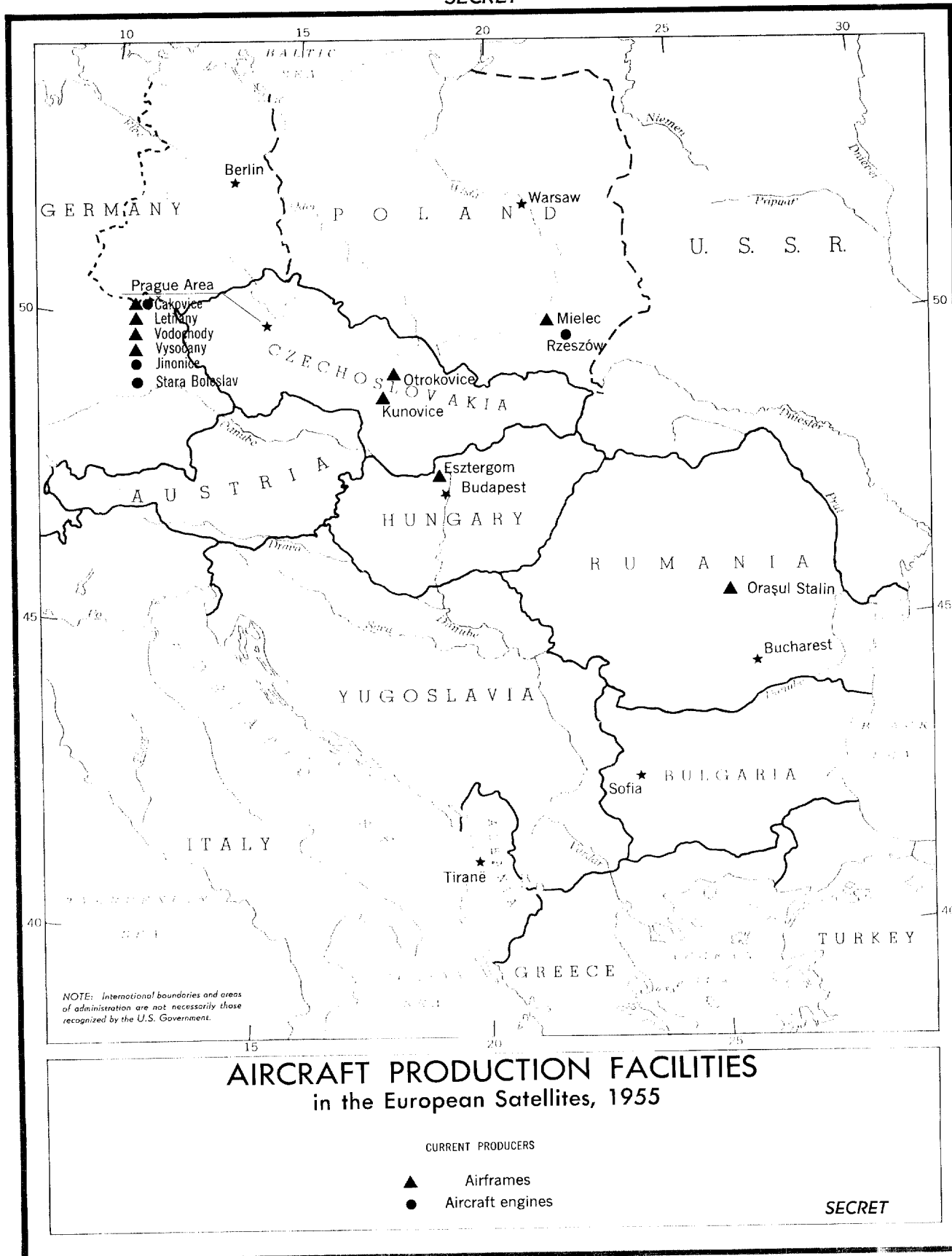
1. Fagot/Midget.

The three plants in the production complex in Prague, Czechoslovakia -- Rudy Letov II in Vodochody, Rudy Letov I in Letnany, and Aero in Vysocany -- have been producing the Midget as well as the Fagot since September 1954. The evaluation of more recent photographs 12/ plus reports of continued plant expansion 13/ indicates that the final assembly plant in Vodochody is somewhat larger than was originally estimated and that construction is not yet completed. 14/

* For the location of aircraft production facilities in the European Satellites, see the map, following p. 6.

** Table 2 follows on p. 7.

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Table 2

Facilities for the Production of Airframes in the European Satellites
January-June 1955

<u>Location</u>	<u>Plant</u>	<u>Type of Airframe</u>	<u>Floorspace (Square Feet)</u>
Czechoslovakia <u>a/</u>			
Prague/Vodochody	Rudy Letov II	Fagot; Midget	460,000
Prague/Letnany	Rudy Letov I	Fagot; Midget	553,000
Prague/Vysocany	Aero	Fagot; Midget	237,000
Prague/Cakovice	Avia	Beast	914,000 <u>b/</u>
Kunovice	Let	Moose	225,000
Otrokovice	Zlin	Z-126	63,000
Hungary			
Esztergom	Aero-Ever	Kanya; SG-2	17,000
Poland			
Mielec	WSK	Fagot	563,000
Rumania			
Orasul Stalin	ARMV No. 2	IAR-813	95,000
Total			3,130,000 <u>c/</u>

a. The airframe plants in Czechoslovakia are listed in order of importance.

b. This figure represents airframes only.

c. Rounded.

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The Rudy Letov I plant in Letnany appears to be producing wings, tail planes, and nose sections. 15/ The Aero plant, which formerly produced the whole fuselage, 16/ apparently now is devoting a substantial portion of its activity to developmental work 17/ and probably produces only the aft section of the fuselage.

The WSK plant in Mielec, Poland, also is producing the Fagot but at a much lower rate. Recent observation indicates that the plant operates on 2 shifts rather than 1 shift, as had been assumed. 18/ The plant recently constructed next to the Lublin/Swidnik airfield may have begun to supply subassemblies to the WSK plant in Mielec, although no shipments have been sighted. 19/

2. Beast.

Production of the Beast, its engine, and its propeller at the Avia plant in Cakovice, near Prague, Czechoslovakia, was cut back sharply in 1954 and is expected to cease by mid-1955.

The Avia plant is by far the largest aircraft plant in the European Satellites, and the question of what it will produce next is of considerable significance. It has the capability to produce jet light bombers, as evidenced by its large floorspace, skilled labor supply, and diversified production history.

3. Reciprocating Trainer.

The remaining four airframe producers in the European Satellites are the Let plant in Kunovice and the Zlin plant in Otrokovice, Czechoslovakia; the Aero-Ever plant in Esztergom, Hungary; and the ARMV No. 2 (Ateliere Reparatii Material Volant No. 2) or Aircraft Repair Shop No. 2 in Orasul Stalin, Rumania. Of these, the largest and most important is the Let plant in Kunovice, which produces the Moose. The other three plants currently are producing a limited number of reciprocating trainers.

During 1954 a limited number of Junak-1 primary trainers was produced at the GIL (Główny Instytut Lotnictwa -- Institute of Aeronautical Research) plant in Warsaw/Okecie, Poland. This plant is an aeronautical research institute which specializes in development work and prototype production. It is unlikely that the GIL plant will produce aircraft in series. Because production stopped around the end

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of 1954, 20/ the GIL plant is not listed as a current producer in Table 2.

B. Aircraft Engines.

The production of aircraft engines is taking place in the Avia plant and the Jan Sverma plant in Prague, Czechoslovakia; a new Jan Sverma plant in Stara Boleslav, Czechoslovakia; and the PZL plant in Rzeszow, Poland. These 4 plants, listed in Table 3, have a total floorspace of 1.82 million square feet.

Table 3

Facilities for the Production of Aircraft Engines
in the European Satellites
January-June 1955

<u>Location</u>	<u>Plant</u>	<u>Type of Engine</u>	<u>Floorspace (Square Feet)</u>
Czechoslovakia			
Prague/Cakovice	Avia	AM-42 (piston)	556,000
Prague/Jinonice	Jan Sverma	VK-1 and RD-45 (jet); small piston	600,000
Stara Boleslav	Jan Sverma	VK-1 and RD-45 (jet)	100,000
Poland			
Rzeszow	PZL	VK-1 (jet)	563,000
Total			1,820,000 <u>a/</u>

a. Rounded.

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The Avia plant in Cakovice currently is producing AM-42 piston engines for the Beast, which is expected to go out of production in the near future. If future plans call for the production of jet aircraft at Avia, the aircraft engine section would be capable of the production of jet engines because it is a large plant with extensive experience in the production of engines.

The Jan Sverma plant in Jinonice produces VK-1 engines for Fagots and RD-45 engines for Midgets, plus small numbers of piston engines and propellers used in Czechoslovak, Hungarian, and Rumanian trainers. It is the most experienced producer of aircraft engines in the European Satellites and probably will continue to be the major producer.

The new plant in Stara Boleslav, which probably began production in the latter half of 1953, is a branch of the Jan Sverma plant in Jinonice. Very little is known about the activities of this installation, which has been reported as an assembly and engine-testing plant. 21/ Because the limited information available indicates that the plant is quite small, it is probable that it will continue to act as an auxiliary of the Jan Sverma plant in Jinonice rather than as an independent plant producing complete aircraft engines.

Because the Jan Sverma plant in Jinonice is operating at somewhat less than half its capacity, it is doubtful that construction of the plant in Stara Boleslav was intended primarily to increase production. The main reason probably was the necessity of moving engine-testing, a very noisy activity, away from such a densely populated area as Prague. Security considerations also may have influenced the location; the plant is in a wooded area, making it difficult to observe and less vulnerable to bombing attacks.

The PZL plant in Rzeszow, Poland, produces VK-1 engines for Polish Fagots produced at the WSK plant in Mielec. The plant operates 2 shifts (probably undermanned), except for engine-testing, which apparently is done on 3 shifts. 22/

Another small plant, named Zaklady Metalowe, 23/ in Psie Pole, Poland, has produced M-11 engines for various Polish aircraft. In 1954 it is assumed that the plant produced M-11 engines for Junak-1 trainers. Because the production of the Junak-1 ended in 1954, it is assumed that production of the M-11 also stopped in 1954, and the plant is not listed as a current producer in Table 2.

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III. Aircraft Production.

A. 1951-54.

1. In Physical Units.

a. Airframes.

The production of airframes in the European Satellites for 1951-54, by country and by type of airframe, is shown in Table 4.* Estimates for 1951-53 have not been changed significantly. Previous estimates of the production of airframes during 1954 24/ have been lowered to reflect a sharp cutback in the production of the Beast at the Avia plant in Cakovice, Czechoslovakia, 25/ and a slowdown in production at the Rudy Letov II plant in Vodochody, Czechoslovakia, 26/ probably in connection with the initiation of Midget production at Vodochody. Of the airframes produced in the Satellites in 1954, 64 percent were combat types, and 45 percent were Fagots. The remainder of the airframes produced were trainers, including Midget jet trainers.

Czechoslovakia produced 83 percent of the airframes produced in the European Satellites during 1954, including almost all the combat airframes. The production of Fagots in Poland, which began in late 1953, was still accelerating in mid-1955. Poland also produced a number of primary trainers in 1954. Hungary and Rumania probably produced a few light trainers. The other European Satellites did not produce any airframes.

b. Aircraft Engines.

The production of aircraft engines in the European Satellites for 1951-54 is shown in Table 5.** The major production has taken place in two plants in Czechoslovakia -- the Jan Sverma plant in Jinonice and the engine section of the Avia plant in Cakovice. Poland, the only other producer, has supplied M-11 and VK-1 engines for its own production of airframes. The other airframe producers in the Satellites use aircraft engines from Czechoslovakia.***

* Table 4 follows on p. 12.

** Table 5 follows on p. 13.

*** Continued on p. 14.

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Table 4

Estimated Production of Airframes in the European Satellites
1951-54

						Units
Location	Plant	Type of Airframe	1951	1952	1953	1954
Bulgaria						
Lovech	No. 14	Laz	93	103	103	0
Czechoslovakia						
Prague/Vodochody	Rudy Letov II	Fagot	0	0	256	394
		Midget	0	0	0	89
Prague/Letnany	Rudy Letov I	Fagot	0	26	38	0
Prague/Vysocany	Aero	Aero-45	56	0	25	0
Prague/Cakovice	Avia	Beast	0	52	457	207
Kunovice	Let	Moose	0	0	1	100
Otrokovice	Zlin	Z-381	135	135	65	65
		Z-22				
		Z-26				
		Z-126				
Chocen	Benes-Mraz	Sokol	50	50	0	0
Hungary						
Esztergom	Aero-Ever	Kanya SG-2	20	20	20	24
Poland						
Lodz	LWD	Zuch-2	4	0	0	0
Mielec	WSK	Mule (CSS-13)	100	30	0	0
		Fagot	0	0	1	65
Warsaw/Okecie	GIL	Junak-1	0	0	0	60

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Table 4

Estimated Production of Airframes in the European Satellites
1951-54
(Continued)

						Units
<u>Location</u>	<u>Plant</u>	<u>Type of Airframe</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
Rumania						
Orasul Stalin	ARMV No. 2	IAR-813	24	24	24	24
Total			<u>482</u>	<u>440</u>	<u>990</u>	<u>1,028</u>

Table 5

Estimated Production of Aircraft Engines in the European Satellites a/*
1951-54

						Units
<u>Location</u>	<u>Plant</u>	<u>Type of Engine</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
Czechoslovakia						
Prague/Cakovice	Avia	AM-42	0	151	994	466
Prague/Jinonice	Jan Sverma	Praga D	90	90	67	0
		Walter Minor 4-III	654	402	211	227
		Walter Minor 6-III	231	254	254	27
		RD-45	0	58	662	200
		VK-1	0	0	0	890
		Ash-21	0	0	0	210

* Footnote for Table 5 follows on p. 14.

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Table 5

Estimated Production of Aircraft Engines in the European Satellites a/
1951-54
(Continued)

						Units
<u>Location</u>	<u>Plant</u>	<u>Type of Engine</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
Poland						
Psie Pole	Zaklady Metalowe	M-11	225	68	0	135
Rzeszow	PZL	VK-1	0	0	2	146
Total			<u>1,200</u>	<u>1,023</u>	<u>2,190</u>	<u>2,301</u>

a. This table lists the total production of aircraft engines, including replacements and spare parts. The figures were obtained by estimating the number of engines required for both the single- and multi-engine types of airframes, multiplying by a factor of 2.25, and allowing for the import of engines from the USSR.

Reports received earlier indicated that the Jan Sverma plant in Jinonice began production of the VK-1 engine 27/ probably around the beginning of 1954. It was originally assumed that production of the less powerful RD-45 engine was stopped at the same time. Since then, however, the Midget, which uses the RD-45, was put into production at the Rudy Letov II plant in Vodochody. 28/ Because it is unlikely that Czechoslovakia would import from the USSR an engine which it recently had produced itself, it is estimated that the Jan Sverma plant produces the RD-45 as well as the VK-1.

Ash-21 engines for the Moose produced in Czechoslovakia also are now produced at the Jan Sverma plant in Jinonice. The first 17 engines received at the Let plant in Kunovice were produced in the USSR, 29/ but engines received subsequently were produced at the Jan Sverma plant. 30/

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2. By Value.

The estimated value of the production of airframes and aircraft engines in the European Satellites in US dollars at 1951 prices is shown in Table 6. The table is based on the costs of production data given in Appendix B* and the production data in Table 4.** The values include the production of spare parts.

Table 6

Estimated Value of the Production
of Airframes and Aircraft Engines
in the European Satellites
1951-54

Country ^{a/}	Thousand 1951 US \$			
	1951	1952	1953	1954
Bulgaria	458	506	506	0
Czechoslovakia	3,780	24,900	200,000	172,000
Hungary	60	60	60	70
Poland	2,100	627	371	20,000
Rumania	133	133	133	133
Total	<u>6,530</u>	<u>26,200</u>	<u>201,000</u>	<u>192,000</u>

a. Albania and East Germany did not produce airframes or aircraft engines during 1951-54.

Table 6 indicates that Czechoslovak production accounted for almost 90 percent of the total value of production in the European Satellites during 1954. The very low value of the Czechoslovak production in 1951 and 1952 was caused by the changeover to the production of Fagots and Beasts. Production in Poland took a similar drop in 1952 and 1953, when preparations for the production of Fagots were under way.

* P. 31, below.

** P. 12, above.

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These apparent irregularities of the value curve are indicated in Table 6 because no methodology has yet been devised for allocating pre-production costs. Considerable expenditure of funds is required for materials procurement and parts fabrication for more than a year before the first aircraft is produced.

3. Index by Value.

The index of the value of the production of airframes and aircraft engines in the European Satellites, with 1951 as the base year, is shown in Table 7. The value of production increased 29 times, although the number of airframes produced increased only 2.1 times (see Table 4*). Not only have aircraft plants increased their activity, but also they now produce expensive combat aircraft instead of simple sports and trainer types.

Table 7

Index of the Estimated Value of the Production
of Airframes and Aircraft Engines
in the European Satellites
1952-54

Country ^{a/}	Index (1951 = 100)		
	1952	1953	1954
European Satellites	401	3,080	2,940
Bulgaria	110	110	0
Czechoslovakia	660	5,300	4,550
Hungary	100	100	117
Poland	29	18	952
Rumania	100	100	100

a. Albania and East Germany did not produce airframes or aircraft engines during 1951-54.

* P. 12, above.

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B. 1955-57.

1. By Type.

a. Jet Fighter.

Czechoslovakia and Poland are expected to continue the production of jet fighters. Production of the Fagot probably will be phased out in favor of a more modern jet fighter, probably the Fresco (MIG-17). The European Satellites require a fighter of this type because their air forces are responsible for the air defense of the area. Both Czechoslovakia and Poland are capable of producing the Fresco in their present jet fighter production facilities.

The timing of the changeover to the production of the Fresco in either Czechoslovakia or Poland is not known. It is believed that production of the Fresco in Czechoslovakia will begin in 1956. Poland, which was slower to begin production of the Fagot, probably will not change from the production of Fagots to Frescos until 1957.

b. Jet Light Bomber.

The Avia plant in Cakovice, Czechoslovakia, may start producing the Beagle, possibly in late 1955. This estimate is supported only by indirect evidence. Production of the older Beast and its engine at the Avia plant has stopped. Approximately 250 Beasts were in open storage at Prague airfields in December 1954 31/; so the Avia plant presumably soon will be starting on new production of some sort. The appearance of Beagles in the Czechoslovak, Rumanian, and Hungarian Air Forces 32/ indicates that the Russians intend to incorporate jet light bombers into the air forces of other European Satellites besides the Polish Air Force, which has had Beagles since 1953.

Czechoslovakia requires Beagles, and the Avia plant, which otherwise soon would become inactive, has the capability to produce them. These considerations, plus a report claiming that Czechoslovakia will produce a larger twin-jet aircraft, 33/ indicate that the Beagle and its engines may well be the next items of production at the Avia plant.

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c. Transport.

The requirements for transport aircraft in the European Satellites have been met in the past by imports from the USSR, except for the Aero-45 small transport aircraft. Recent reports, however, indicate that East Germany has been reorganizing its aircraft industry since mid-1954 and plans to produce Soviet-designed Crate light transport aircraft. 34/ It is not yet clear where the production of airframes will take place -- at the former Siebel plant in Schkeuditz 35/ or at a new plant to be built in Dresden-Klotzsche. 36/ The Siebel plant seems more likely. The aircraft engines reportedly will be produced at a plant in Karl Marx Stadt. 37/ Allowing time for organization and tooling, production of the Crate probably will begin around mid-1956.

East Germany also is working on plans for a 4-jet transport aircraft designated "152." It reportedly will carry 24 passengers and have a gross weight of 43,000 kilograms (kg). The engines, designated "014," are to have 3,000-kg thrust. 38/ One defector doubts that the "152" will ever be produced. Design work still is in the early stages, and in any event, the "152" would not be ready for production until after 1957. Even then, it seems questionable whether the USSR would permit the Germans to gain the prestige of producing the first 4-jet transport aircraft in the Soviet Bloc.

d. Other Production.

The production of Midgets probably will continue until 1957. The Midget is the only two-seat jet trainer produced in the European Satellites, and production began only recently. If political conditions should change, however, the Rudy Letov II plant in Vodochody, Czechoslovakia, which is devoted to the production of the Midget, could be converted readily to the production of the Fresco.

The Aero-45 4-passenger transport aircraft probably will be produced at the Let plant in Kunovice, Czechoslovakia. Reports indicate the planned production of the Aero-45 at Kunovice. 39/ The extensive exhibition and advertising of the Aero-45 in non-Soviet Bloc countries lends support to the reports. 40/

An all-metal modified version of the Czechoslovak Sokol sports aircraft, called the "Avia LD-40" or the "Meta-Sokol," was described recently in the Polish press. 41/ If Czechoslovakia

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should decide to produce this prototype, the Benes-Mraz plant in Chocen, Czechoslovakia, would be the most likely producer because the Sokol was made there.

2. In Physical Units.

The estimated production of airframes in the European Satellites for 1955-57 is shown in Table 8.* The estimate was based, in large part, on the assumption that the scale of effort at which the airframe plants were operating in 1954 and early 1955 would be maintained during 1955-57. The estimated production of Crates in East Germany is based on a report that the planned peak rate was to be 10 units per month. 42/ Changes in the estimated rate of production of individual plants from year to year are caused by the introduction of new models and by a gradual buildup to a constant rate.

3. By Value.

The estimated value of the production of airframes and aircraft engines in the European Satellites for 1955-57 is shown in Table 9.** The table shows that only Czechoslovakia, Poland, and East Germany are expected to produce a significant value of production. The estimated value of aircraft produced in Czechoslovakia in 1957 will be over 70 percent of the total Satellite production for the year.

4. Index by Value.

The index of the value of the production of airframes and aircraft engines (including all spares) in the European Satellites for 1955-57 is shown in Table 10.*** The base year used is 1954. Comparison with Table 4**** and Table 8* indicates that the index of the number of airframes produced increased by only 26 percent from 1954 to 1957, whereas the index of the value of production increased 81 percent. The discrepancy is caused by the higher prices of the more complex aircraft which are to be produced in 1957.*****

* Table 8 follows on p. 20.

** Table 9 follows on p. 21.

*** Table 10 follows on p. 21.

**** P. 12, above.

***** Continued on p. 22.

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Table 8

Estimated Production of Airframes in the European Satellites
1955-57

					Units
<u>Location</u>	<u>Plant</u>	Type of <u>Airframe</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Czechoslovakia					
Prague/Vodochody	Rudy Letov II	Fagot	236	0	0
		Midget	276	276	276
		Fresco	0	180	277
Prague/Cakovice	Avia	Beast	60	0	0
		Beagle	6	75	125
Kunovice	Let	Moose	242	249	249
Otrokovice	Zlin	Aero-45	25	25	25
		Z-126	65	65	65
East Germany					
(Undetermined location)		Crate	0	8	75
Hungary					
Esztergom	Aero-Ever	Trainer	24	24	24
Poland					
Mielec	WSK	Fagot	193	196	82
		Fresco	0	0	79
Rumania					
Orasul Stalin	ARMV No. 2	IAR-813	24	24	24
Total			<u>1,151</u>	<u>1,122</u>	<u>1,301</u>

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Table 9

Estimated Value of the Production
of Airframes and Aircraft Engines
in the European Satellites
1955-57

Thousand 1951 US \$			
Country ^{a/}	1955	1956	1957
Czechoslovakia	146,000	202,000	252,000
East Germany	0	5,520	51,800
Hungary	70	70	70
Poland	45,800	45,800	45,200
Rumania	133	133	133
Total	<u>192,000</u>	<u>254,000</u>	<u>348,000</u>

a. Albania and Bulgaria are not expected to produce aircraft.

Table 10

Index of the Estimated Value of the Production
of Airframes and Aircraft Engines
in the European Satellites
1955-57

Index (1954 = 100)			
Country ^{a/}	1955	1956	1957
European Satellites	100	132	181
Czechoslovakia	85	118	146
East Germany ^{b/}	0	100	940
Hungary	100	100	100
Poland	229	229	226
Rumania	100	100	100

a. Albania and Bulgaria are not expected to produce aircraft.

b. The base year for East Germany is 1956.

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C. Mobilization Potential.

The estimated production of aircraft in the European Satellites during 1955-57 is far below the capacity potential of their aircraft industries. Former aircraft plants not producing currently could recommence production, and the current producers, now operating at an average scale of effort of about 50 percent, could double their production. Judging from experience during World War II, East German plants could make a major contribution to the production of aircraft in the Satellites. Estimates of the mobilization potential of the aircraft industries of the Satellites have not changed significantly since the estimate made in 1954 in a previous report. ^{43/}

IV. Imports and Exports, 1953-54.

A. Aircraft.

Estimates of the number of aircraft imported by the European Satellites from the USSR and Czechoslovakia, by country and by type, are shown in Table 11 and Table 12, respectively.* The figures relate only to aircraft in each country's own air force and do not include aircraft belonging to Soviet Air Force units stationed in the Satellites.

Tables 11 and 12 indicate that the number of aircraft imported by the European Satellites from the USSR declined steadily from 1952 to 1954. Since Czechoslovakia and Poland began the production of Fagots and Beasts in 1952 and 1953, the Satellites have been growing increasingly self-sufficient in the production of aircraft. In 1954 the only significant imports from the USSR were 35 Beagles and 10 Cabs. In March 1955, Czechoslovakia and Hungary first received a small number of Beagles. ^{44/} If indications that Czechoslovakia will produce Beagles and that East Germany will produce Crates are substantiated, the Satellite dependence upon imports of Soviet aircraft will decrease still further.

* Tables 11 and 12 follow on p. 23.

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Table 11

Estimated Imports of Aircraft into the European Satellites, by Country
1953-54

Importing Country ^{a/}	1953		1954	
	From	From	From	From
	the USSR	Czechoslovakia	the USSR	Czechoslovakia
Bulgaria	100	0	10	15
Czechoslovakia	0	0	20	0
Hungary	79	19	25	40
Poland	174	122	35	35
Rumania	20	105	10	60
Total	<u>373</u>	<u>246</u>	<u>100</u>	<u>150</u>

a. Albania and East Germany imported no aircraft.

Table 12

Estimated Imports of Aircraft into the European Satellites, by Type
1953-54

Type of Aircraft	1953		1954	
	From	From	From	From
	the USSR	Czechoslovakia	the USSR	Czechoslovakia
Jet fighter	294	99	10	110
Attack	0	147	0	40
Light bomber				
Jet	35	0	35	0
Piston	32	0	20	0
Transport	12	0	10	0
Other	0	0	25	0
Total	<u>373</u>	<u>246</u>	<u>100</u>	<u>150</u>

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In 1954, Czechoslovakia, the only European Satellite that exports aircraft, for the first time surpassed the USSR as a supplier of aircraft to the Satellites. Czechoslovakia provided 60 percent of all Satellite imports of aircraft, including over 90 percent of the jet fighters. In addition, Czechoslovakia has been engaged since 1954 in a drive to increase sales to non-Soviet Bloc countries of non-combat aircraft (Aero-45 small transport aircraft and Z-126 trainers). Czechoslovak aircraft and aircraft engines are being exhibited at trade fairs and advertised in newspapers and magazines. As yet, however, there is no evidence that any country has actually purchased these products recently.

The estimates of imports from the USSR are derived from annual changes in the Air Order of Battle estimates and may be low because they do not reflect the losses caused by normal attrition. The Czechoslovak production of Fagots and Beasts plus the Polish production of Fagots is believed sufficient to account for all increases in the Air Order of Battle of the European Satellites for these types since the beginning of 1954.

B. Aircraft Engines.

An estimate of the number of aircraft engines imported by the European Satellites from the USSR and Czechoslovakia in 1953 and 1954 is shown in Table 13.* These imports include the replacement engines and spare parts required for the original aircraft shipments shown in Table 11 and Table 12, as well as the engines imported from Czechoslovakia for installation in airframes produced in Bulgaria, Hungary, and Rumania. Poland, however, produced the aircraft engines required for its own production of airframes. Czechoslovakia reportedly received the first 17 Ash-21 engines for Moose airframes from the USSR, although subsequent engines came from Czechoslovak production. 45/

C. Value of Imports.

The estimated value of Czechoslovak exports of aircraft and aircraft engines to the European Satellites in 1953 and 1954 is shown in Table 14.** The values represent the estimated costs of production, based on analogy with comparable US aircraft types, and are subject to a wide margin of error. There is no information on the policy of pricing

* Table 13 follows on p. 25.

** Table 14 follows on p. 26.

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military goods sold to the other Satellites, and it is possible that the prices are very different from the production costs. On a value basis, 1953 exports represented 33 percent of the total aircraft production of Czechoslovakia, and in 1954 the figure was 15 percent.

Table 13

Estimated Imports of Aircraft Engines into the European Satellites
by Country a/
1953-54

Importing Country <u>b/</u>	1953		1954	
	From	From	From	From
	the USSR	Czechoslovakia	the USSR	Czechoslovakia
Bulgaria	131	232	12	19
Czechoslovakia	2	0	53	0
Hungary	111	69	44	104
Poland	298	152	88	44
Rumania	25	185	12	129
Total	<u>567</u>	<u>638</u>	<u>209</u>	<u>296</u>

a. These figures include replacement engines and spare parts but exclude engines installed as original equipment in imported aircraft. They were computed by multiplying the original engines in imported aircraft by a factor of 1.25 and adding to this the engines imported for airframes of native production, using a factor of 2.25 (see Appendix B).

b. Albania and East Germany received no aircraft engines.

The prices paid by the European Satellites for Soviet aircraft cannot be estimated. The majority of the piston and possibly also of the jet aircraft imported from the USSR were used aircraft -- phased out of the Soviet Air Force because they were considered obsolescent. It is not possible to determine a depreciation factor for such aircraft.

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Table 14

Estimated Value of Aircraft and Aircraft Engines
Exported from Czechoslovakia
to the European Satellites a/
1953-54

Thousand 1951 US \$		
Importing Country <u>b/</u>	1953	1954
Bulgaria	580	3,360
Hungary	4,800	9,110
Poland	33,200	7,840
Rumania	26,900	5,710
Total	<u>65,500</u>	<u>26,000</u>

a. These figures include the value of aircraft and spare parts, spare engines, and parts for imported aircraft, and engines and parts imported for airframes of native production.

b. Albania and East Germany received no aircraft or aircraft engines.

V. Input Requirements.

A. Cobalt.

Since input requirements for the production of airframes and aircraft engines in the European Satellites were estimated in a recent CIA report, 46/ examination of Soviet jet engines produced more recently indicates that the USSR has reduced significantly the cobalt content of its jet engine alloys. 47/ Czechoslovak-produced jet engines also were reported to have a lower cobalt content than previously because of the necessity of conserving cobalt, which was in short supply. 48/ The revised estimates of cobalt requirements for the aircraft industries (specifically, the jet engine industries) of the European Satellites are as follows:

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<u>Year</u>	<u>Metric Tons</u>
1954	19
1955	25
1956	28
1957	33

B. Other Inputs.

Estimates of other input requirements for the production of airframes and aircraft engines have not changed significantly since the publication of a recent CIA report. 49/

VI. Limitations and Vulnerabilities.

The major current limitation to the production of aircraft in the European Satellites appears to be a shortage of critical alloying materials, especially cobalt. The Satellites are dependent upon the USSR for alloying elements, and the USSR apparently cannot or will not supply sufficient material to permit a smooth flow of production. Substitution of less satisfactory alloys reportedly lowered the quality of jet engines produced in Czechoslovakia. 50/

East Germany is reported to be short of the skilled personnel capable of organizing the production of new types of aircraft. 51/ As the first type to be produced in East Germany is the Soviet-designed Crate, this limitation may be overcome by drawing on Soviet experience in the production of the Crate.

Under wartime conditions the very high degree of concentration in Prague of the aircraft industries of the European Satellites would be a major vulnerability. In spite of this vulnerability, much of the recent construction and expansion of aircraft plants has been in the Prague area. Under present conditions the concentration of production in Prague simplifies the problems of supply and communication.

As Polish production increases and as East Germany begins production of aircraft, the strategic vulnerability of overconcentration of the industry will be decreased. Further dispersal among the remaining European Satellites, however, is not feasible, because of the low production potential of all the Satellites except Czechoslovakia, East Germany, and Poland.

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APPENDIX A

GLOSSARY OF AIRCRAFT DESIGNATIONS USED IN THIS REPORT

<u>US-UK Designation of Airframe</u>	<u>Soviet and Satellite Designation of Airframe</u>	<u>Standard Designation of Aircraft Engine</u>	<u>Description</u>
Aero-45	Aero-45	2 x Walter Minor 4-III	Small Transport
Beast	IL-10	AM-42	Ground Attack
Beagle	IL-28	2 x VK-1A	Jet Light Bomber
Cab	LI-2	2 x Ash-62	Light Transport
Crate	IL-14	2 x Ash-82	Light Transport
Fagot	MIG-15; S-102; S-103	RD-45 or VK-1	Jet Fighter
Flora	YaK-23	RD-500	Jet Fighter
Fresco	MIG-17	VK-1A	Jet Fighter
IAR-813	IAR-813	Walter Minor 6-III	Traîner
Junak-1	Junak-1	M-11	Primary Traîner
Kanya	R-18	Walter Minor 6-III	Glider Tow
Laz	Laz	Walter Minor 6-III	Traîner
Max	YaK-18	M-11	Traîner
Midget	U-MIG-15; S-104	RD-45	Jet Traîner
Moose	YaK-11	Ash-21	Advanced Traîner
Mule	PO-2; CSS-13	M-11	Traîner
SG-2	SG-2	Walter Minor 4-III	Traîner
Sokol	Sokol	Walter Minor 4-III	Sports
Z-22	Z-22	Praga D	Sports
Z-26	Trener	Walter Minor 4-III	Traîner, Sports
Z-126	Trener	Walter Minor 4-III	Traîner
Z-381	Bu-181	Walter Minor 4-III	Traîner
Zuch-2	Zuch-2	Bramo SH-14	Traîner

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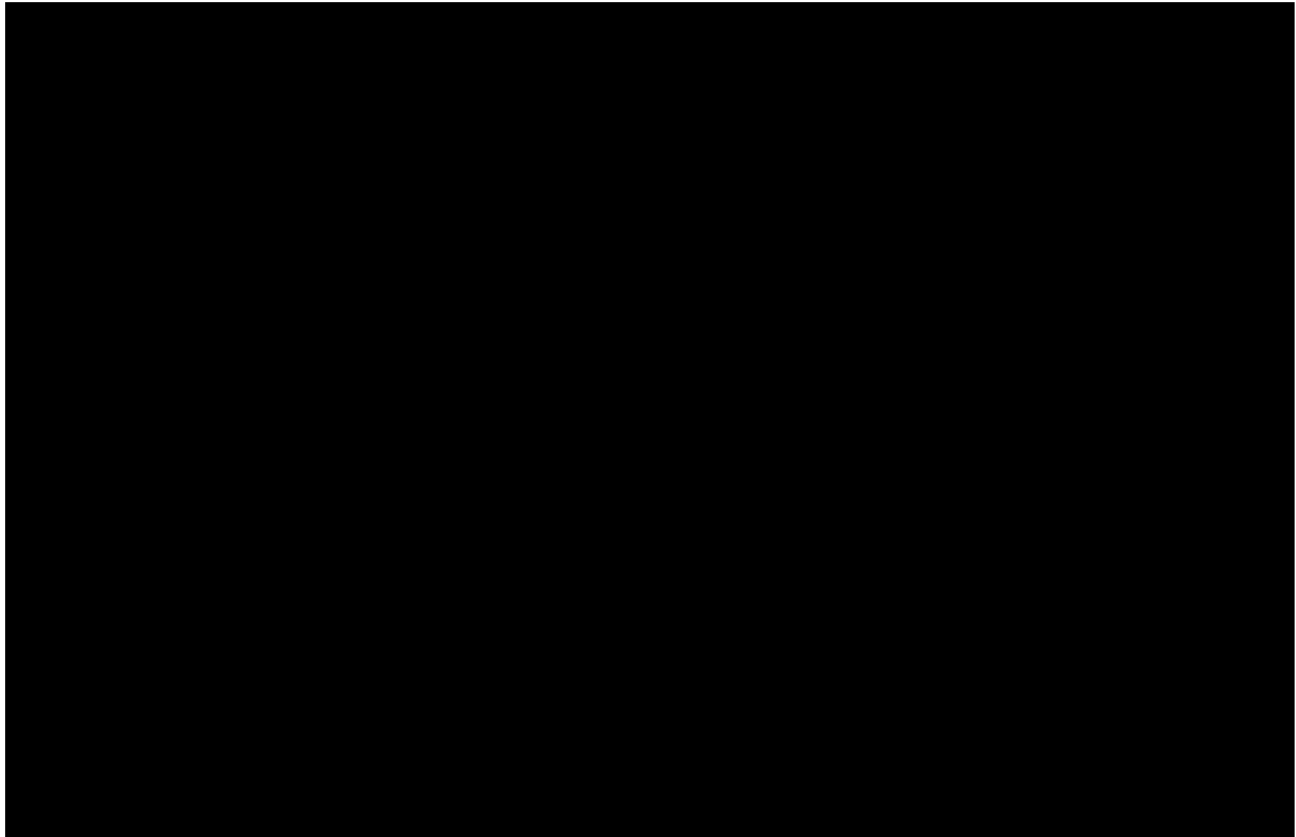
APPENDIX B

METHODOLOGY

1. Production.

The methodology used in deriving the estimates of the current production of airframes by the major airframe producers in the European Satellites was the analysis of all available intelligence on each production facility in comparison with known US production standards. The small plants producing light sports aircraft and trainers could not be analyzed by this method, because the information available on them was not sufficient to permit the evaluation of the necessary formula factors. The final production estimate for these plants, therefore, was based directly on an evaluation of available intelligence reports.

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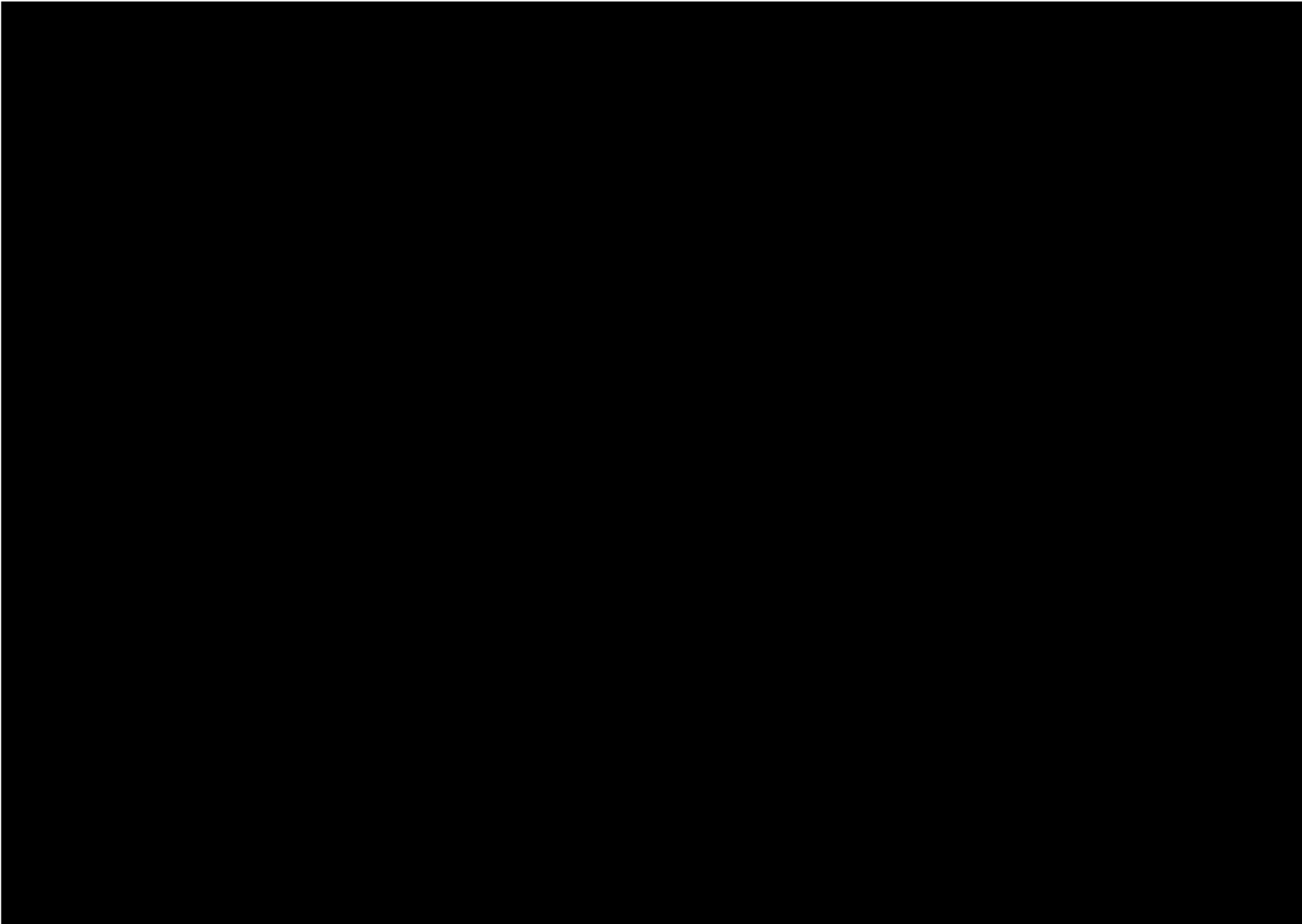
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f. Spare Parts.

No information is available at present on the amount of spare parts produced by the European Satellites. The US industry produced 24 percent spare parts for trainers and 18 percent for fighters, by weight, during World War II. Because the Satellites generally are small countries with limited inventories of spare parts, it is believed that their requirements for spare parts probably are somewhat less than those of the US.

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g. Summary Table.

Table 15* presents the methodology factors used to estimate the 1954 production of each airframe and aircraft engine plant in the European Satellites. In the case of the Avia plant in Cakovice, Czechoslovakia, and the Fagot production complex in Prague, where production was cut back during 1954, strict use of the methodology was not practicable.

h. Margin of Error.

As is evident from the discussion of the derivation of the methodology factors, direct evidence alone is not sufficient to determine the factors with any degree of precision. Reliance must be placed on analogy with US data and, ultimately, on the judgment of the analyst. The rather high margin of error inherent in the methodology is reduced somewhat, however, by crosschecking with other indicators, such as Air Order of Battle and defector and attache reports. The resulting margin of error is estimated to be from minus 15 to plus 20 percent for estimates of past annual production and from minus 50 to plus 100 percent for estimates of future production.

* Table 15 follows on p. 35.

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Table 16

Estimated Value of Selected Aircraft
and Aircraft Engines
Produced in the European Satellites
1954

US 1951 Dollars

Aircraft <u>a/</u>	<u>Price</u>
Aero-45	29,700
Beast	273,000
Beagle	881,000
Crate	692,000
Fagot	b/
Fresco	b/
IAR-813	8,900
Junak-1	7,420
Kanya	7,420
Laz	7,420
Midget	b/
Moose	66,200
Mule	23,100
SG-2	7,420
Sokol	10,400
Z-22	8,900
Z-26	8,900
Z-126	11,900
Z-381	8,900
Zuch-2	7,420

Aircraft Engines c/

Walter Minor 4-III	1,500
Walter Minor 6-III	2,500
RD-45, VK-1, or VK-1A	30,000

a. The value includes airframe,
aircraft engine, accessories, and
all spare parts.

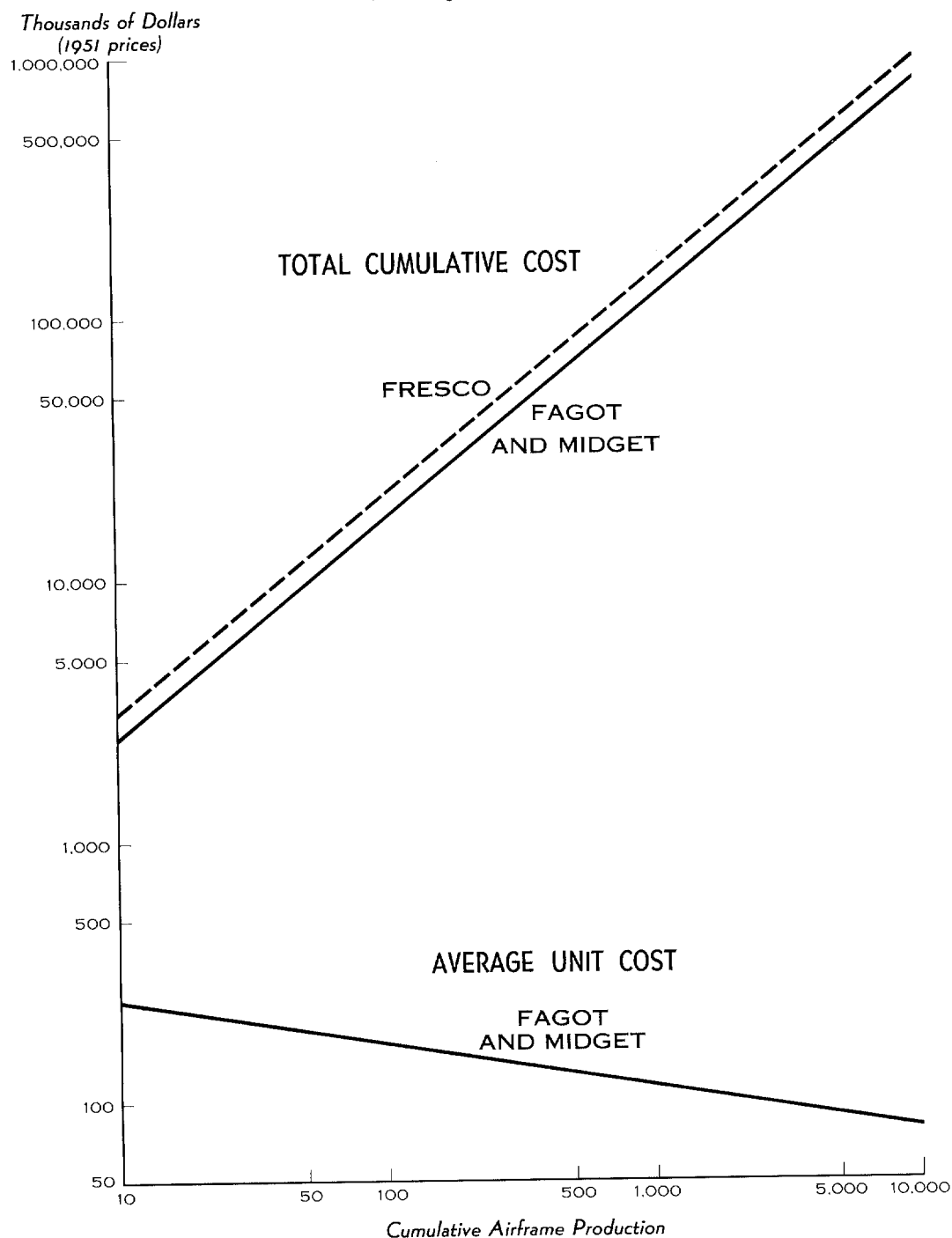
b. See the chart, following p. 38.

c. The value represents only a
single aircraft engine.

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COST OF FAGOT, MIDGET, AND FRESCO AIRFRAME PRODUCTION

(Including airframe spare parts)



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APPENDIX C

GAPS IN INTELLIGENCE

1. Prices.

Data on the value of production of aircraft and aircraft engines in the European Satellites have been almost nonexistent. Collection activity at trade fairs might be able to fill this gap, at least for noncombat types.

2. Scale of Effort.

Estimates of the scale of effort in the aircraft industries of the European Satellites depend upon the number of workers employed and the number of shifts worked in a given plant. Reliable information was available for only a few plants. More precise observation is required on the number of shifts worked and the number of workers leaving and entering the plant at each shift.

3. Plant Activity.

The type of aircraft (or subassembly) in production is known for most of the aircraft in the European Satellites plants through 1953. Information is lacking as to current and planned future production activity, especially in the Avia plant in Cakovice, Czechoslovakia.

4. Other.

The following additional gaps in intelligence exist but are considered less important than the preceding ones:

a. Budgetary Data.

There is no information available on the planned or actual expenditures on aircraft production in the European Satellites.

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b. Efficiency.

Estimates of efficiency in the aircraft industries of the European Satellites have had to be based on numerous qualitative reports because there are no quantitative data available. Information on Satellite production norms (with clear definitions of terms) would allow a more direct comparison with US data.

c. Imports and Exports.

Reports on imports and exports of aircraft and aircraft engines of the European Satellites are almost nonexistent. Data on types, quantities, and prices paid are needed.

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APPENDIX D

SOURCE REFERENCES

The largest number of sources used in this report came from defectors and CIA CS reports. Most of the defector reports used in this report were from fairly knowledgeable sources whose information compared well with previous data. The CIA CS reports are much less reliable on the average, but in some cases they provide the only information available.

Attache observations were the second major source of information. Although limited to visual observation of the exterior of any installation, attache sightings can help to confirm or to refute other reports whose reliability and accuracy otherwise could not be judged.

The large body of US aircraft industry data available has been modified to reflect the practices of the European Satellites and then used for estimates of floorspace productivity and prices.

Other sources include the analysis of captured Soviet equipment and photographs. The analysis of the Soviet equipment was the basis for estimates of input requirements for cobalt, and the photographs were the only reliable information on plant floorspace. Very little information was obtained from the press of the European Satellites.

Evaluations, following the classification entry and designated "Eval.," have the following significance:

<u>Source of Information</u>	<u>Information</u>
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

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"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which may carry the field evaluation "Documentary."

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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